NC Employees Workplace Program Requirements for

Safety and Health

Lead

Purpose

Requirements for protection of State employees from exposure to lead have been established to provide guidelines for compliance with 29 CFR 1910.1025, the occupational Safety and Health Administration (OSHA) lead standard for general industry, and 29 CFR 1926.62, the OSHA lead standard for construction. The general industry standard became effective March 1, 1979 and the construction standard became effective June 3, 1993. These requirements should be applied with flexibility and according to the situation or operation performed.

Scope of the OSHA Lead Standard

The general industry lead standard applies to all occupational exposures to air-borne lead except exposures on construction sites and exposures resulting from agricultural operations covered by 29 CFR 1928.

The construction lead standard applies to all construction work where air-borne lead is present in any amount. Construction work is defined as work for construction, alteration, and/or repair, including painting and decorating. This includes maintenance operations associated with these construction activities.

Lead Uses and Sources

Lead is a naturally occurring element that is found in geological formations the world over. Lead is combined with other metals to make them machinable and it is a component of paints, glazes, bullets, plastic coating for wire, solder, fishing sinkers, and hundreds of other items. It was used in gasoline until the mid-1980s. In building construction, lead is frequently used for roofs, cornices, tank linings, and electrical conduits.

For adults the principal route of exposure to lead is inhalation and for children it ís ingestion. While lead is most readily absorbed by inhalation, it can on a lesser scale be absorbed through the digestive system as the result of hand-to-mouth contact with lead-contaminated skin, food, cigarettes, clothing, or other contaminated objects. No regulation covers handling of lead but if there is prolonged contact use of gloves is probably a good idea even for adults. It is always a good idea to wash your hands before eating, drinking, and smoking and this is true after handling lead also. Rarely, a third type of lead poisoning may occur from the absorption of organic lead compounds through the skin.

In residences and outdoors, the primary source of lead in air, on surfaces, and in soil are (1) emissions from lead smelting and municipal waste incinerators, (2) lead released from natural lead deposits in the earth's crust due to weathering and volcanic activity, (3) old fallout from leaded gasoline, (4) paint particles released from painted surfaces due to erosion or during removal, and (5) cigarette smoke. The smoke from one cigarette contains about a microgram (ug) of lead of which 10 to 15% is absorbed into the smoker's body. The rest is released into the surrounding air. EPA limits the concentration of lead in outdoor air to 1.5 ug per cubic meter (cum) and the concentration in water to 5 parts per billion (ppb), and requires that waste containing 5 milligrams per liter (mg/l) or more using the Toxicity Characteristic Leaching Procedure be disposed of as toxic waste.

Operations in the workplace that are major sources of lead in the air and on surfaces include (1) flame-torch cutting, welding, the use of heat guns, and sanding, scraping and grinding of lead painted surfaces in repair, reconstruction, dismantling, and demolition work; (2) abrasive blasting of bridges and other structures containing lead paints; (3) maintaining process equipment or exhaust duct work, and (4) the manufacture of various products containing lead. OSHA enforces an 8-hour time weighted average limit of 50 ug/cum in workplace air. On this basis, the acceptable daily dose that can be inhaled by the average worker day-after-day over a 40-year working life is 500 micrograms a day.

Paint for consumer use is limited to 600 ppm (0.06%) by the Consumer Protection agency. If the lead concentration is below that level, the lead content need not appear on the label. If the lead concentration is below 1000 ppm (0.1%), the lead content need not appear on the Material Safety Data Sheet.

Medical Aspects

When absorbed into the body above certain doses lead is toxic. A significant portion of the lead inhaled, absorbed, or ingested gets into the blood stream. Once in the blood stream, lead is circulated through the body. Some of this lead is quickly filtered out of the body and excreted. The remainder is stored, mostly in the bone but also in organs and body tissues. Lead isolated in bone does no harm and serves to isolate the lead from nerve tissue and organs such as the liver and kidneys where it can cause serious damage. If lead exposure is prolonged or excessive, the bone storage site becomes saturated and can no longer serve as a buffer. As exposure continues, the capacity of the bone may be exceeded and lead will increase in tissues where it can cause irreversible damage, first to individual cells, then to organs and whole body systems.

Health impairment and disease can arise after exposure periods as short as days (acute overexposure) or as long as several years (chronic overexposure). Acute overexposure can lead to acute encephalopathy, a condition affecting the brain that develops quickly into seizures, coma, and death from cardio respiratory arrest. Acute occupational overexposure of this type is highly unusual, but not impossible. Similar forms of encephalopathy, however, may arise from extended chronic overexposure to lower doses of lead. Consequently, there is no sharp distinction between rapidly developing acute effects of lead and longer term chronic effects.

Long-term (chronic) overexposure may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems of both men and women. Damage to the central nervous system in general and the brain in particular is one of the most severe forms of lead poisoning. Lead can alter the structure of sperm cells—raising the risk of birth defects—and there is evidence of miscarriage and stillbirth in women overexposed to lead or whose husbands have been overexposed to lead. Some common symptoms of overexposure include loss of appetite, constipation, excessive tiredness, headache, fine tremors, colic with severe abdominal pain, metallic taste in the mouth, weakness, nervous irritability, hyperactivity, muscle and joint pain or soreness, anxiety, pallor, insomnia, numbness, and dizziness.

Children born of parents who were overexposed to lead are more likely to have birth defects, mental retardation, or behavioral disorders, or to die during the first year of childhood.

Children tend to absorb more lead than adults and lead is more damaging to their developing bodies and brains than to adults. The adverse health effects of lead exposure among children are a major public health problem.

The blood lead level is a good indication of recent exposure to and current absorption of lead. The zinc protoporphyrin level is, however, a more reliable indication of the total body burden of lead.

Blood lead levels in Americans have been dropping steadily because of the elimination of leaded gasoline, the banning of lead in interior and exterior house paint in 1978, the banning of most lead plumbing pipes and lead solder in plumbing, the elimination of lead solder from cans made in the U.S., and new requirements for firing ceramic wares to keep lead from leaching out. The average adult carries about 5 to 6 ug of lead per deciliter of blood (ug/dl). The Federal Drug Administration says that levels of 30 or above in adults are unhealthy and the Centers for Disease Control and Prevention (CDC) deems blood levels of 10 and above in children a matter of concern.

Risk of Working in a Building that Contains Lead Paint

Lead paint in buildings is a hazard for children. Eventually the paint may flake and peel and children may eat the chips. The CDC knows of no cases, however, where adults have been poisoned by lead by simply inhabiting a building painted with lead paint.

In any case, paint that is in good condition is not a problem, nor is paint that has been painted over with lead-free paint, unless painted surfaces rub together and create dust (as on window frames). If dust is a problem, the dust needs to be controlled so occupants of the building do not inhale it and a thorough clean-up with a detergent needs to be done to clean up residual dust before the area is reoccupied.

OSHA Regulations

The North Carolina Occupational Safety and Health Administration enforces regulations 29 CFR 1910.1025 and 29 CFR 1926.62 which govern general industry and construction operations that involve occupational exposure to lead.

The General Industry and Construction Lead Standards are compared in Table 1.

The OSHA Action Level (AL) is 30 micrograms per cubic meter of lead in air. When the AL is exceeded, employers must carry out specific provisions of the standards including periodic exposure monitoring, initial medical surveillance, and employee training.

Construction activities must be supervised by a competent person. A competent person must have experience, training, and credentials relevant to lead hazards and specific competent person activities, responsibilities, and authority as designated by the employer in the written compliance program. This includes identifying lead hazards and taking corrective action.

The OSHA Permissible Exposure Limit (PEL) is 50 micrograms per cubic meter (ug/cum) of air based on an 8-hour time weighted average without regard to respirator use. The PEL is the daily dose most workers can receive day after day over a 40 year working life without suffering adverse effects. While this dose is safe for most people, safe does not mean

completely safe. Anything that is chemically active in the body may be risky. PELs are useful in warning employees of risk and letting them know what to look for in case it comes along. Employees, in turn, need to listen to and pay attention to their bodies and discuss signals and warnings with their physicians.

OSHA requires exposure be monitored and documented when employees are exposed to airborne lead. When feasible engineering controls have been put in place and respirators are used to limit worker exposure, an employee's exposure can be determined by dividing the measured lead level by the protection factor of the respirator. Periods of respirator use and time the respirator is not worn are averaged together to arrive at a calculated exposure. The exposure may be based on objective data and historical measurements, as well as on monitoring. Employers must notify employees of monitoring results and, if the concentration exceeds the PEL, include a description of the corrective actions that will be taken. They must also let employees observe monitoring. Observers are entitled to explanations of monitoring procedures and to the results of monitoring.

For some Trigger Tasks, the construction standard requires protecting employees as if the exposure exceeds specific levels until exposure monitoring is completed. Task-related triggers and required protective measures are shown in Tables 2 and 3.

The Written Compliance Program must be prepared before work starts. An example of a written compliance program is attached.

When the PEL is exceeded, employers must use Engineering or Administrative Controls, or both, to reduce exposure below the PEL to the extent feasible. The following controls are applicable to certain operations: (1) Power tools equipped with dust collection shrouds or other attachments exhausted through a HEPA vacuum system when removing lead paint; (2) Local exhaust ventilation for operations such as welding, cutting/burning, and heating; (3) HEPA vacuums during clean-up activities; (4) Containment structures; (5) Encapsulating materials; (6) Enclosures; (7) Substitutes for lead containing materials; (8) Work procedures and equipment that reduce exposure; and (9) Administrative controls.

Respiratory Protection must be used where feasible controls are not sufficient to reduce the concentration below the PEL, whenever an employee requests a respirator, and as interim protection for employees doing tasks listed in Table 2. An employee must be given a powered air-purifying respirator instead of the respirator specified in Table II if he chooses to wear this type of respirator and if it provides adequate protection. Respirator users must be enrolled in a respirator program which sets forth procedures for respirator selection; respirator use, cleaning, maintenance, fit-testing; provisions for medical surveillance; and a schedule of training for respirator users.

Protective Clothing and Equipment must be provided when the PEL is exceeded and users must be trained. Contaminated clothing and equipment must be stored in labeled, closed containers. People who handle and wash contaminated clothing must be told of potential hazards.

Housekeeping means keeping surfaces free of lead accumulation by vacuuming or other effective means; storing collected dust and debris in labeled containers and handling according to DENR (EPA) hazardous waste regulations.

Hygiene Facilities, such as wash stations, must be provided wherever there is exposure to air-borne lead. In addition, showers, change rooms, and clean lunch areas must be provided

and smoking, eating, drinking, and applying makeup must be prohibited in areas in which the PEL is exceeded. The employer must make sure facilities are used. Contaminated water must be disposed of according to DENR (EPA) regulations. To determine if surfaces of hygiene facilities are free of contamination, OSHA recommends the use of HUD's recommended level for acceptable decontamination of 200 ug/sq ft for floors in evaluating cleanliness of change areas, storage facilities, and lunchrooms or eating areas.

Medical Surveillance must be available to all employees exposed above the action level, with test frequency related to the exposure level, frequency of exposure, and the medical test results. There must be provisions for a second medical opinion and medical consultation. The employer must be sure that employees are told what their blood levels are.

Medical Removal affords specified protection to employees who must be removed from work because their blood levels exceed 50 ug/dl, or because lead exposure above the action level, in combination with other medical conditions, places them at risk.

Employee Information and Training, as required by the OSHA Hazard Communication Standard, must be given to all employees exposed to airborne lead. Employees exposed above the action level must be given additional training about specific hazards associated with the work environment, protective measures, and rights under the standard. Training must be done before work starts and annually thereafter.

Signs must be posted in each work area where the concentration exceeds the PEL.

Records must be kept on (1) exposure monitoring and assessment, (2) medical surveillance, and (3) medical removal and must be made available to employees and their designated representatives and to NIOSH and OSHA.

EPA Regulation

Regulations to carry out the purpose of Title X of the Housing and Community Development Act were finalized by EPA on August 29, 1996. The regulations require that individuals conducting lead-based paint inspections, risk assessments, and abatements in target housing and child-occupied facilities are properly trained and certified. The North Carolina Lead-Based Paint Hazard Management Program became effective July 1, 1998, under NCAC T15A: Lead-based paint is defined by the EPA as paint which contains 5% or more of lead by weight or 1 milligram per square centimeter or more of lead. NCAC T15A: 19C.0800 requires accreditation of people who perform lead based paint activities such as inspections, risk assessments, or abatement of a child occupied facility or target housing. The Health Hazards Control Branch of DENR is responsible for certifying these workers. Abatement means measures to permanently eliminate lead-based paint hazards. Abatement does not include renovation, remodeling, landscaping, or other such activities even though these activities may incidentally result in a reduction or elimination of lead-based paint hazards. "Child occupied facility" means a building constructed before 1978 visited regularly by the same child, 6 years of age or under, on at least two different days within any week provided that each days visit lasts at least 3 hours and the combined weekly visit lasts at least 6 hours, and the combined annual visits last at least 60 hours. "Target housing" means any housing constructed before 1978, except for housing for the elderly or persons with disabilities and except for any zero-bedroom dwelling. This act does not apply to public and commercial buildings, bridges, and superstructures although at some date it may be extended to these structures.

For information on lead, check www.hud.gov/lea, www.cpsc.gov, http://www.cdc.gov/niosh/, and the NIOSH hot line for lead, 800-638-2772. The publication Protecting Workers Exposed to Lead Based Paint No. 98-112 is available from NIOSH.

Comparison of OSHA General Industry & Construction Standards for Lead

Table 1

Protective Measures (See definitions in narrative)	Construction	General Industry
Action Level (AL)	30 ug/cum	30 ug/cum
Competent Person	**Required**	**Not required**
Permissible Exposure Limit (PEL)	50 ug/cum	50 ug/cum
Trigger Tasks	**3 lists with assumed exposures**	**None**
Exposure Monitoring	Required at AL or for Trigger Tasks	Required at AL
Written Compliance Program above PEL above PEL	**Required for 1 day**	**Required at 30 ays**
Engineering/Administrative Controls	Required if >PEL	Required if >PEL
Respiratory Protection	**Required if >PEL**	**Required if >PEL**
Respirator Protection Factors	Strictest of all standards	Not as strict as for construction
Protective Clothing	**Required if >PEL**	**Required if >PEL**
Housekeeping	Required; compressed air allowed	Required; compressed air prohibited
Hygiene Facilities	**Change rooms, lunch areas & showers if >PEL**	**Showers (if feasible), change rooms, and lunch areas if >PEL**
Medical Surveillance	Bloodwork after 1 day at AL	Bloodwork after 30 days at AL
Medical Removal	**Required if >50 ug/dl**	**Required if >50ug/dl**
Employee Training	Required	Required
Signs Posted	**Required if >PEL**	**Required if >PEL**
Extensive Recordkeeping	Required	Required
Hand Washing Facilities	**Required**	**Required**
Smoking, eating, etc.	Prohibited if >PEL	Prohibited if >PEL

Presumed Exposures for Specific Task

Table 2

Presumed Exposures for Specific Tasks, ug/cum

50-500	500-2500	>2500
Manual demolition	Power tool cleaning	Abrasive blasting
Manual scraping	w/o dust collection	Welding, cutting,
Manual sanding	Clean-up of dry	& torch burning
Heat gun applications	expendable abrasives	
General clean-up	Movement & removal	
Power tool cleaning	of abrasive blasting	
with dust collection systems	enclosures	
Spray painting	Rivet busting	
Any other task where there	Use of lead-containing	
is reason to believe the PEL	mortar	
could be exceeded	Lead burning	

Protective Measures

Table 3

Protective Measures Required When There is Potential Exposure to Airborne Lead at Any Level. Initial training that meets the OSHA Hazard Communication Standard requirements.

- Hand washing facilities (construction) or lavatories (general industry). Additional Protective Measures Required When Air-borne Concentrations of Lead Exceed the PEL but

Use of Respirators Reduces Exposure Below the PEL.

- Coveralls, gloves, hats, shoe coverlets, and face shields or other appropriate protective equipment
- Change areas
- Showers (Only where feasible on construction sites)
- Respirators as specified in 1926.62(f) and 1910.1025(f)
- Annual training as specified in 29 CFR 1926(l) and 1910.1025(l)
- Engineering and work practice controls when exposure exceeds the PEL for more than 30 days a year in general industry and on construction sites to the extent feasible
- Additional Protective Measures Required When Exposure to Air-borne Lead

Exceeds the AL or PEL

- Initial medical surveillance consisting of blood sampling & analysis when exposure equals or exceeds the AL on any day (construction only)
- Medical surveillance program consisting of periodic biological monitoring and medical examinations and consultations when exposure equals or exceeds the AL for more than 30 days in any consecutive 12 months

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An Example of a Plan for Removal of Lead-Containing Paint

A PROCEDURE FOR REMOVAL OF LEAD-CONTAINING PAINT

Lead containing paint will be removed from the walls and ceiling of the hallway of Building A of the XYZ state facility. The total area of paint to be removed is _____ square feet.

Two employees of the Maintenance Department will trowel paste onto the painted surfaces and cover the paste with a fibrous laminated cloth. Twenty-four hours after applying the paste, they will use a taping knife to pry up the edges of the cloth and remove the cloth, paste and paint away in one piece. They will remove as much of the residue as possible with the knife or other tool. They will place the cloth, paste, and paint in plastic bags and dispose of them in compliance with local regulations.

After removal of the cloth, paste, and paint, they will sponge the surface with water. After 24 hours, they will clean the surface with an alkaline solution.

B PROTECTIVE MEASURES

Maintenance employees will wear Tyvek suits with hoods, Tyvek booties, face shields, and rubber gloves taped to the sleeves of the Tyvek suits during the removal operation.

C TECHNOLOGY CONSIDERED

These three technologies were considered: (1) Removal using a hand-held power sander, (2) Use of a contained blast system, and (3) Chemical removal using a paste.

D AIR MONITORING DATA

Since no lead is emitted into the air when paint is removed chemically using a paste, there will be no need to monitor exposures.

E SCHEDULE

The paste will be applied to the painted surfaces and covered with a cloth on (Date). The paste, paint, and cloth will be removed and disposed of and the walls will be rinsed off on (Date).The walls will be cleaned with an alkaline solution on (Date).

F WORK PRACTICE PROGRAM

The maintenance workers will take the protective measures described in Section B of this plan. They will perform the same tasks for the same time period; there will be no task rotation.

G ADMINISTRATIVE CONTROL SCHEDULE

Since there will be no rotation of tasks, an administrative control schedule is not applicable to this project.

H ARRANGEMENTS WITH CONTRACTORS

No part of this project has been contracted out.

NC Employees Workplace Program Requirements for Safety and Health

Resources

OSHA for General Industry	29 CFR 1910.1025
OSHA for the Construction Industry	29 CFR 1926.62